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September 6, 1960

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Dear

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Enclosed please find Technical Report Number 1 on the
development of AP-3 and PS-10 power supplies.

Very truly yours,

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Vice President

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Enclosure

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TECHNICAL REPORT NUMBER 1

DEVELOPMENT OF AP-3 AND PS-10 POWER SUPPLIES

This report covers the progress which [] has made towards the development of the AP-3 and PS-10 power supplies from the date of inception of the contract through August 31, 1960. The original proposed schematic diagram has had to be modified somewhat in order to meet the required specifications. These modifications were made necessary because of the following results obtained with the original schematic:

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Our initial proposed schematic called for the regulated 12 Volt, 2 Ampere output to be obtained using a Zener diode regulator. When the circuit was breadboarded, it was found that the highest powered Zener diode, which we were able to obtain, was not sufficient to handle the load under the environmental conditions expected. We investigated several types of Zener diodes but were not able to obtain sufficiently good regulation to satisfy the requirements.

We next investigated a simple transistor regulator which we found easily fulfilled the specifications. It had the additional advantage of dissipating less power and lowering ripple as compared to the Zener diode regulator. Because of the requirement that the minus side of both the regulated and unregulated outputs shall be common, it is necessary that separate secondary windings on the power transformer be provided. This will somewhat increase the expected size of the power transformer and, therefore, of the complete supply.

At this point we had progressed far enough to be able to furnish design specifications for the transformer to several manufacturers. We have not yet received replies from all of the manufacturers solicited because of the severe size restrictions we have placed on the unit. As a design target we allocated 20 cubic inches for the power transformer. The initial reactions of the transformer manufacturers were that 30 to 35 cubic inches will be required. Until we have a definite minimum size established, it will not be possible to determine the final overall size of the unit. At this point it appears that some increase over that specified will be necessary.

The present schematic diagram is shown in Figure 1. The present breadboard correspondence to this schematic has been tested and meets all the electrical requirements of the specification with the exception of the ripple on the unregulated output. The specified maximum ripple is 1.2 Volts, whereas we are presently achieving a ripple of 1.3 Volts. We feel that the difference is not significant and request that you consider relaxing the specification so as to permit this slightly higher ripple. On the other hand, we have exceeded the required performance of the regulated supply by a considerable amount. The regulation and ripple are several times better than required.

We have enlisted the aid of several other companies to help us in the miniaturization of the supply. In particular, [] has investigated the special electrolytic capacitors to obtain maximum capacitance in minimum case sizes.

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